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ABSTRACT

This paper demonstrates a method for constructing long variables using items that elicit partically correct responses across ages. Long variables may be defined by students at different ages (year levels) attempting common items within a test containing other items considered to be appropriate for each age or year level. A developmental model of understanding is described in the form of vertically equating a student's response with expectations for increasing sophistication in the response range. A unit from the Victorian Social Education Study on the long variable of "cultural understanding" is provided to exemplify the technique. The paper demonstrates the use of the Rasch partial credit model for mapping student responses onto this continuum of cultural understanding. Stimulus material, items, sample responses, and the analysis are all outlined in detail. (EH)

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# The Construction of a Long Variable of Conceptual Development in Social Education

by
Brian Doig

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# The construction of a long variable of conceptual development in social education

Brian Doig

The Australian Council for Educational Research

***Abstract***

*The purpose of this paper is to demonstrate a method for constructing long variables using items that elicit partially correct responses across ages. A unit from the Victorian Social Education Study is used to demonstrate the technique. This unit describes the long variable 'cultural understanding' and the paper demonstrates the use of the Rasch partial credit model for mapping student responses onto this continuum of cultural understanding. Stimulus material, items, sample responses, and the analysis are all described in detail.*

## LONG VARIABLES

The construction of any variable must begin with the notion of a dimension on which students can be placed, ordered, and compared. In practice, this variable is made concrete by creating items that (i) are instances of the variable under consideration, and (ii) elicit observations that allow student's position on the dimension to be gauged. Each item is merely an example from all possible items defining the dimension and is comparable to any other item. A test consists of a collection of these dimension-defining items and as such defines some part of the variable's range, often related to an age-group or school year level. For example, the variable mathematics achievement may be tested at year four, giving students' positions within a restricted part of the overall dimension. Long variables as the name suggests seek to provide information on students over a wider age or grade range.

A long variable may be defined by students at different ages (year levels) attempting common items within a test containing other items considered to be appropriate for each age or year level. This practice, vertical equating, is the common method of defining long variables. There are several problems with this approach.

An obvious flaw with vertical equating is that older students may be advantaged by being presented with easy items (those lower on the dimension); these raise the students' estimated position on the dimension; younger students may suffer from the reverse discrimination, as they are faced with (to them) difficult items. Difficult items may also cause attitude problems, as students 'turn off' from a difficult task. Students faced with easy items on the other hand may become bored and not give of their best. A not so obvious problem with vertical equating is that student abilities may be inferred from items that are conceptually different for different age-groups of students. An example of this would be where younger students, for whom a fraction is a number less than one, attempt to make sense of an item involving an improper fraction; older students whose concept of fraction is more developed would be more able to cope with such an item.

Curriculum factors may make items differentially easy or difficult. Consider the young student for whom division is a lengthy process of repeated subtraction, whilst for the older student, taught an algorithm, the item is routine.

Further problems arise when attempting to generalise findings from small sub-samples of items. Drawing inferences from typically few items can be risky, and the remedy,

longer tests, usually not feasible (see Haertel. 1991 for a discussion of these factors in relation to the NAEP tests).

Given all these problems some alternative needs to be considered.

## AN ALTERNATIVE APPROACH TO CONSTRUCTING A LONG VARIABLE

An alternative is to define the variable not by using items to cover the range under consideration but by having the scoring of responses span this range. In this approach every student attempts all items!

This approach is in marked contrast to traditional long variable construction. It does however have some constraints of its own. The approach necessitates items that allow qualitatively different responses to be elicited, and some form of response format that permits the full richness of these responses to be recorded. In the work undertaken at ACER long variable construction has been through the use of items that require responses to be categorised as the first step in the analysis; the final analysis has been through the Rasch Partial Credit Model (Masters, 1982). To more fully appreciate the technique, the assessment of conceptual understanding in social education will be taken as an example.

## AN EXAMPLE

The Victorian Social Education Achievement Study (VSEAS) is one of a series of studies undertaken by the Australian Council for Educational Research for the Victorian Ministry of Education to monitor the quality of learning in key curriculum areas in Victorian schools. The purpose of the study was to survey important outcomes of student learning in social education and conceptual understanding is considered to be one of the an important outcome in social education. Five aspects of social education were explored; geography, history, politics, economics, and cultural understanding.

The conceptualisation of the study was strongly influenced by the tasks and procedures developed by Adams, Doig, and Rosier (1991) for 'tapping students' science beliefs' (TSSBs) and those familiar with that work will be immediately aware of the large debt the social education study owes to their pioneering work. The study has thus benefited from the considerable body of research into students' science beliefs that underpinned the earlier study. There was of course considerable risk involved in assuming that similar patterns would be found in the development of students' conceptual understanding of social concepts in the absence of a similar body of research in this area.

### Assessing conceptions

A large body of research evidence exists which indicates that children have developed explanatory systems that enable them to make sense of the world about them. These understandings are not necessarily compatible with the systems of understandings that adults have, or that schools endeavour to construct. The importance of identifying students' conceptions is that students' conceptions can interact, in unanticipated ways, with teaching that attempts to encourage students to build more useful conceptions.

The techniques used to explore students' conceptions usually require one-to-one interactions between student and researcher. Students can be stimulated by discussion, and the researcher is able to vary the activities to suit the direction of the discussion. While this approach is to be preferred, the limitation is in the number of students which can be accessed. In a large-scale survey program, such techniques are not available.

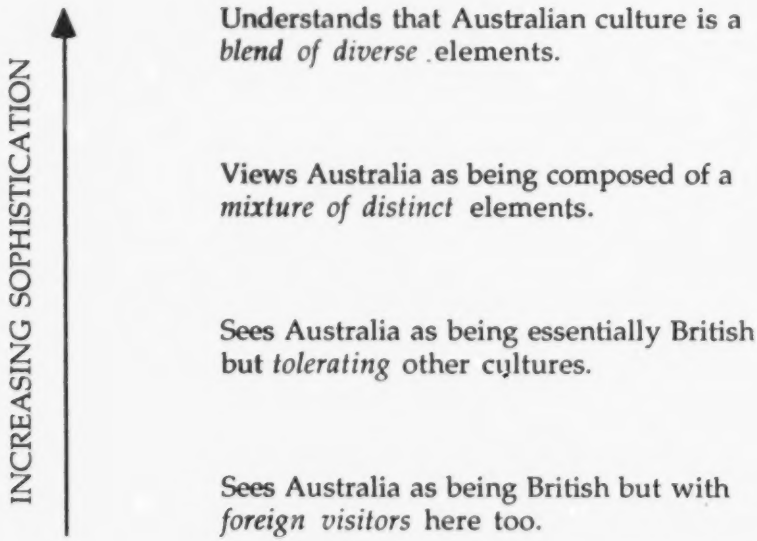
In attempting to assess the conceptions of a large number of students there are two limitations. First the assessment instruments need to be administered by the classroom teacher, with responses recorded by students in a written form. This precludes the use of machine-scorable response formats, such as multiple-choice. Second, the responses elicited must be such that the they can be encoded for analysis and yet retain the essence of the student's thinking. The method of this coding is important, as many authors have argued that every response is idiosyncratic. On the other hand others have argued that these conceptions group themselves into a smaller number of distinct categories (Nussbaum and Sharoni-Dagan, 1983). In the case of responses to questions in other academic disciplines this natural grouping of conceptions appears to exist, and there was no reason to suppose that social education would be different.

**Australian identity**

The Australian Identity unit of the VSEAS was focused upon the development of children's ideas concerning an understanding of Australian culture. That is, to what extent could children isolate and understand the idea of being 'Australian' and subscribe to the view that Australia is a multicultural society. The unit explored this understanding through three distinct paths; what are the symbols used to identify what is Australian (icons and events); what are the meanings behind one of the major symbols (the national flag) and our attitudes to it; and what effects has migration had upon the cultural composition of Australia.

It was hypothesised that children with more sophisticated understandings would be able to extract the essence of cultural identity and divorce it from specific examples, whilst those with a less well developed understanding would either focus on examples or give simple generalisations. The figure below (Figure 1) illustrates the development of the variable as hypothesised.

**Figure1: Hypothesised variable 'Australian culture'**


INCREASING SOPHISTICATION
Understands that Australian culture is a *blend of diverse* elements.
Views Australia as being composed of a *mixture of distinct* elements.
Sees Australia as being essentially British but *tolerating* other cultures.
Sees Australia as being British but with *foreign visitors* here too.

Other definitions of social or cultural understanding are of course possible; the Western Australian Monitoring Standards in Education program defines social education quite differently to the VSEAS for example.

**Stimulus and items**

The context for exploring students' understandings of an Australian identity was asking students to comment on displays which schools were said to have prepared for Australia Day. Students were asked to assess how the displays did or did not express an Australian identity. The unit was administered to 546 Year 5 students (10 year olds) and 523 Year 9 students (15 year olds).

Appendix A contains the stimulus material and associated items used in this unit.

## FIRST ANALYSIS OF RESPONSES

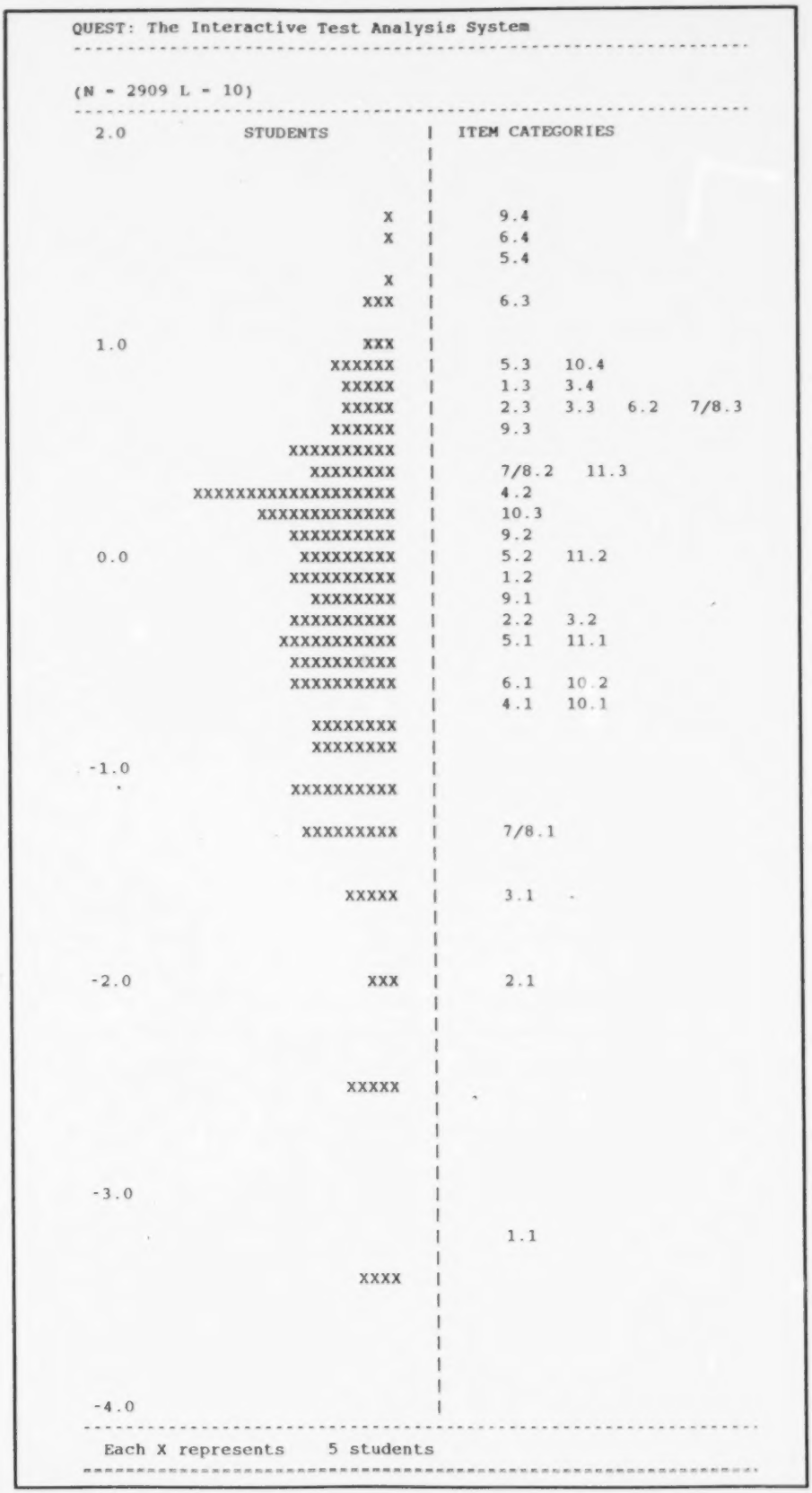
A coding scheme was developed that placed each student's written responses to items into one of a small number of mutually exclusive categories. These categories were developed using the combined evidence of trial data and the responses received in the actual data collection. At the next stage the categories were assigned integer levels. That is, the qualitative response categories were ordered with respect to their sophistication, or naivety, when judged by expert opinion. These level indicators cannot be compared across items and in many cases two or more qualitative responses were assigned to the same level. This categorisation retains most of the richness of the data, yet allows further analysis through the agency of the integer levels. Data losses (un-categorisable responses) are confined to those responses which seldom occur.

Appendix B contains response categories for all items in this unit, and the percentage of responses in that category.

## SECOND ANALYSIS OF RESPONSES

Once categories of response were ordered further anaysis become possible. This analysis integrates responses across items, thus providing a picture of a the continuous variable hypothesised. These ordered categories of response were analysed using the Rasch Partial Credit Model (Masters, 1982) which estimates the difficulty of each level of response. That is it estimates the difficulty of making a response in a particular category. The likelihood of a student giving a particular response is also estimated. These two aspects are integrated in the map of the long variable below (Figure 2). The right-hand side of the map displays each item category-level as x.y, where x is the item number and y the category level. The left-hand side of the map displays the distribution of students on the same scale as the item difficulties. (The interpretation of the category difficulties and student abilities is as for the standard Rasch kidmap).

**Figure 2: The variable 'Australian culture' defined and scaled by student responses.**



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## LONG VARIABLES DESCRIBED

Whilst Figure 2 gives a great deal of information about items, and the variable, the ease of interpretation can be improved. Since each x.y can be represented by a statement about its category of response, it is easy to use these descriptions in lieu of the x.ys. Once this is done, an overall description incorporating each x.y-description can be written and inserted at the appropriate position on the continuum. Figure 3 shows the results of this process for cultural understanding. In the VSEAS study a separate variable was defined for each of the five aspects, and a map similar to Figure 3 created. The separate category descriptions from each of these were combined in a manner analogous to that outlined above, and a variable, social understanding, defined. Appendix C contains each of these six variable maps. Accompanying the description of development for each variable are the ability distributions of the Year 5 and Year 9 students responding to the items for that variable.

**Figure 3: Variable description for cultural understanding.**

```
QUEST: The Interactive Test Analysis System
-------------------------------------------------------------------
Item Estimates (Thresholds)
16-MAR-94 08:37:59                (N = 2909 L = 10)
-------------------------------------------------------------------
  2.0          STUDENTS          |  ITEM CATEGORIES
                                 |
                                 |
                                 |
                              X  |      9.4
                              X  |      6.4
                                 |      5.4
                              X  |                                  Response demonstrates a well-
                            XXX  |      6.3                        developed understanding of
                                 |                                  social change occurring over
  1.0                       XXX  |                                  time as a result of migration.
                         XXXXXX  |      5.3   10.4                  Indicates that Australia is a
                          XXXXX  |      1.3   3.4
                          XXXXX  |      2.3   3.3   6.2   7/8.3    multi-cultural society.
                         XXXXXX  |      9.3
                      XXXXXXXXXX |
                        XXXXXXXX |      7/8.2   11.3
                XXXXXXXXXXXXXXXXXX |   4.2
                     XXXXXXXXXXXX |     10.3                        Response shows a recognition of
                        XXXXXXXXX |     9.2                         the inadequacy of the
  0.0                   XXXXXXXXX |     5.2   11.2                  stereotypical 'Aussie' and
                        XXXXXXXXX |     1.2                         ted symbols.
                        XXXXXXXX  |     9.1
                       XXXXXXXXX  |     2.2   3.2
                      XXXXXXXXXX  |     5.1   11.1
                       XXXXXXXXX  |
                       XXXXXXXXX  |     6.1   10.2                  Response shows an awareness of
                                  |     4.1   10.1                  the multi-faceted nature of
                        XXXXXXXX  |                                 society but does not integrate
                        XXXXXXXX  |                                 these facets.
 -1.0                           |
                       XXXXXXXXX  |
                                  |
                        XXXXXXXX  |     7/8.1
                                  |
                                  |                                 Response focuses on a single
                           XXXXX  |     3.1a                       aspect of society; it provides
                                  |                                 emotional assertions rather
                                  |                                 than analysis.
                                  |
 -2.0                        XXX  |     2.1
                                  |
                                  |
                                  |
                           XXXXX  |
                                  |
                                  |
                                  |
                                  |
 -3.0                             |
                                  |
                                  |     1.1
                                  |
                           XXXX   |
                                  |
                                  |
                                  |
                                  |
                                  |
 -4.0                             |
-------------------------------------------------------------------
  Each X represents    5 students
-------------------------------------------------------------------
```

## CONCLUSION

The long variable, conceptual understanding in social education, was constructed in several stages from the original data. Whilst the initial data gathered was qualitative , subsequent statistical procedures were combined to provide a long variable spanning four years of students' social education. The unique aspect of this variable is that it was constructed from responses that were elicited by the same questions at both year levels. The development of student understanding shown by a variable constructed in this way makes it possible to make inferences about abilities of students who are, age-wise, between the ages of the sampled students.

Whilst the method described above has its own constraints, mainly concerned with creating items that allow responses to span a part of the range of the variable, many of the problems associated with traditional long variable construction are avoided.

The problem of older students being presented with easy items is catered for because the items are not the focus of the analysis; responses are the focus and although they vary from age group to age group, it is this variation that helps define the variable. This is in marked contrast to dichotomous items. It is possible that items are conceptually different for different for each age group, but rather than being obscured by being scored as incorrect, this alternative method uses such information as part of the analysis, allowing the constructed variable to include age-related differences. Pertinent curriculum factors are revealed by this approach too, and tend to enhance rather than detract from the situation.

Finally, as all students respond to all items, the greatest generalisation possible is feasible.

Long variables are useful for those interested in gaining insights into the development of abilities and understandings over time. The approach to their construction outlined here makes it possible not only to construct, but also to interpret these variables in ways useful for curriculum planning and the creation of developmentally appropriate learning activities.

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# APPENDIX A

## A Guide to Australia on Display

VICTORIAN SOCIAL EDUCATION ACHIEVEMENT STUDY

ASSESSMENT TASK NUMBER THREE

## A GUIDE TO AUSTRALIA ON DISPLAY

Some schools have decided to prepare an exhibition to celebrate Australia Day next year. Each school undertook to display a different aspect of what it means to be Australian.

You have been asked to look at the displays in the exhibition and complete a survey about them.

The displays from the schools have been included in the survey booklet.

**Name:** _____

**Year:** _____

**School:** _____

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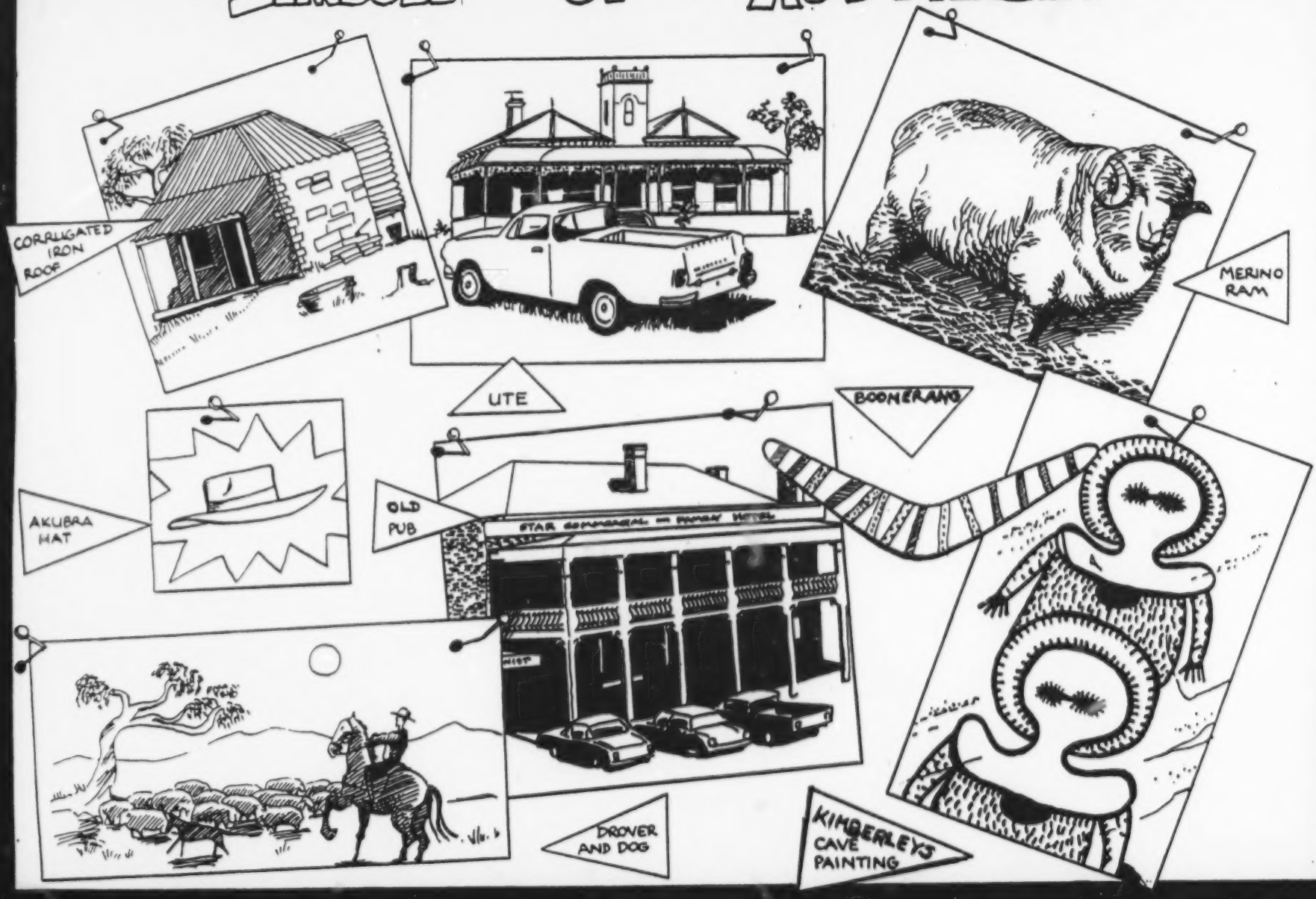
# SYMBOLS OF AUSTRALIA



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## SYMBOLS OF AUSTRALIA

This school presented a display of some symbols which are often thought to be typically Australian. Here is their display.

**What do these symbols tell us about Australia and Australians?**

**Explain how well the display does or doesn't represent life in Australia today.**



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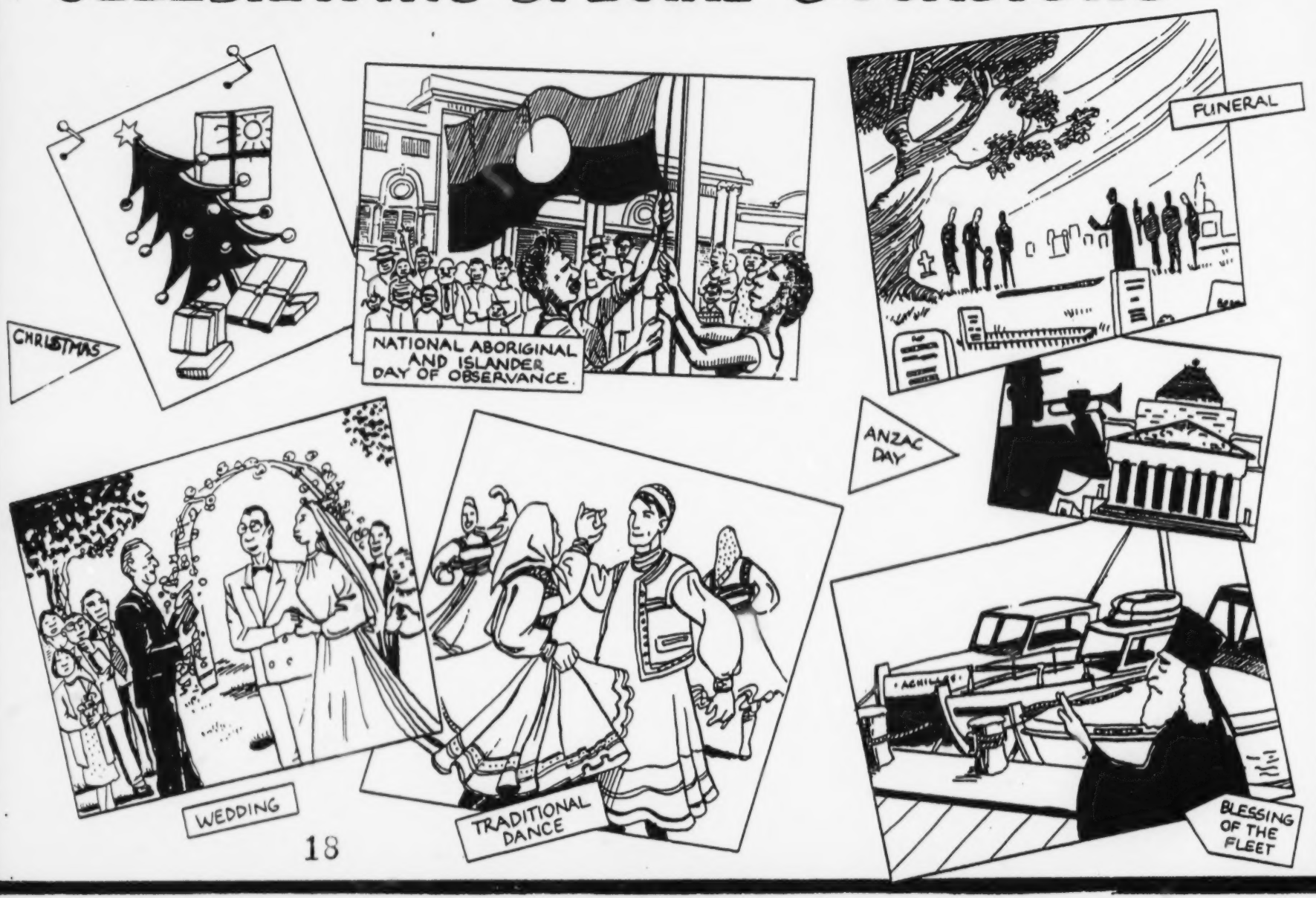
# CELEBRATING SPECIAL OCCASIONS





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## CELEBRATING SPECIAL OCCASIONS

This school presented a display on some customs and traditions that families living in Australia follow when celebrating special occasions. Their display is on the opposite page.

**What do the customs and traditions in the display tell you about Australia and Australians?**

**Explain how well the display does or doesn't represent our Australian way of life.**



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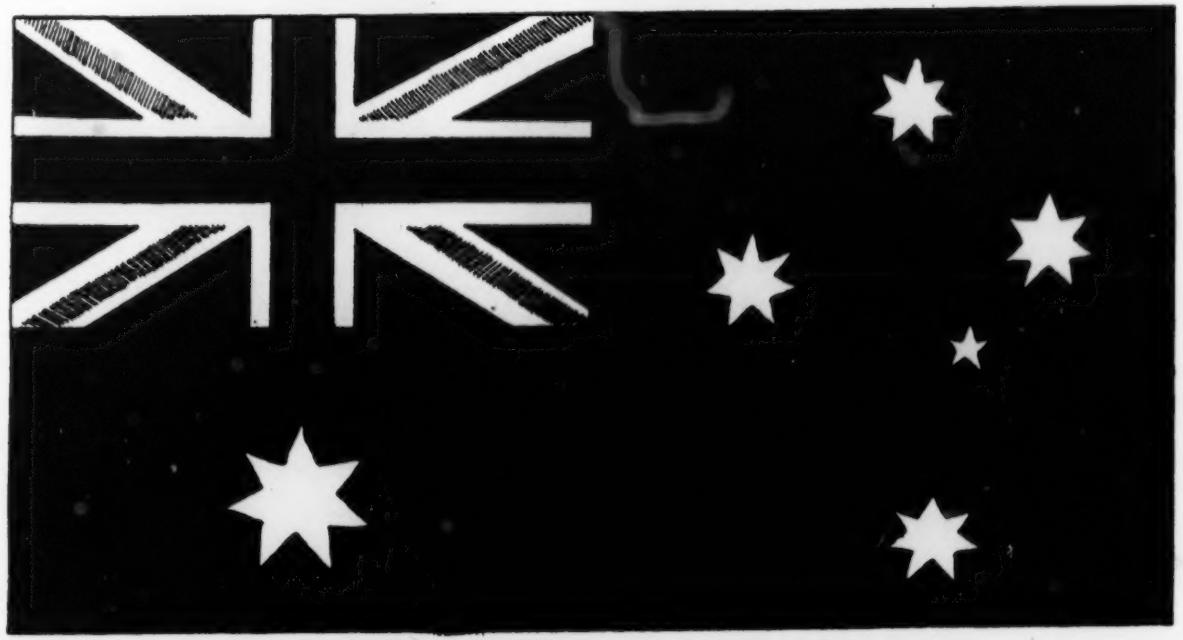
# OUR FLAG




What does our flag tell us about our past?

Should there be a new flag for Australia?

## THE FLAG 1992

| | TOTAL | MEN | WOMEN | 18-24 | 25-39 | 40-54 | 55+ |
|---|---|---|---|---|---|---|---|
| KEEP THE FLAG AS IT IS | 60% | 53% | 66% | 49% | 49% | 61% | 78% |
| CHANGE THE FLAG | 37% | 43% | 30% | 48% | 46% | 36% | 19% |
| DON'T KNOW | 3% | 4% | 4% | 3% | 5% | 3% | 3% |

## CHANGING VIEWS

| | NOW | 1982 |
|---|---|---|
| KEEP THE FLAG AS IT IS | 60% | 69% |
| CHANGE THE FLAG | 37% | 30% |
| DON'T KNOW | 3% | 1% |

ALL PERCENTAGES ARE ROUNDED TO THE NEAREST WHOLE NUMBER. ADAPTED FROM THE SAULWICK 'AGE' POLL ('THE AGE' 11/5/92)

# OUR FLAG

This school presented a display on what the Australian flag means to us. The students chose some questions to help guide them. They put these questions in their display.

**What do you think our flag tells us about our past?**

**What does the 1992 opinion poll tell us about Australians' views on changing the flag?**

**What do the polls suggest is likely to happen in the future?**

**Why do you think this might happen?**



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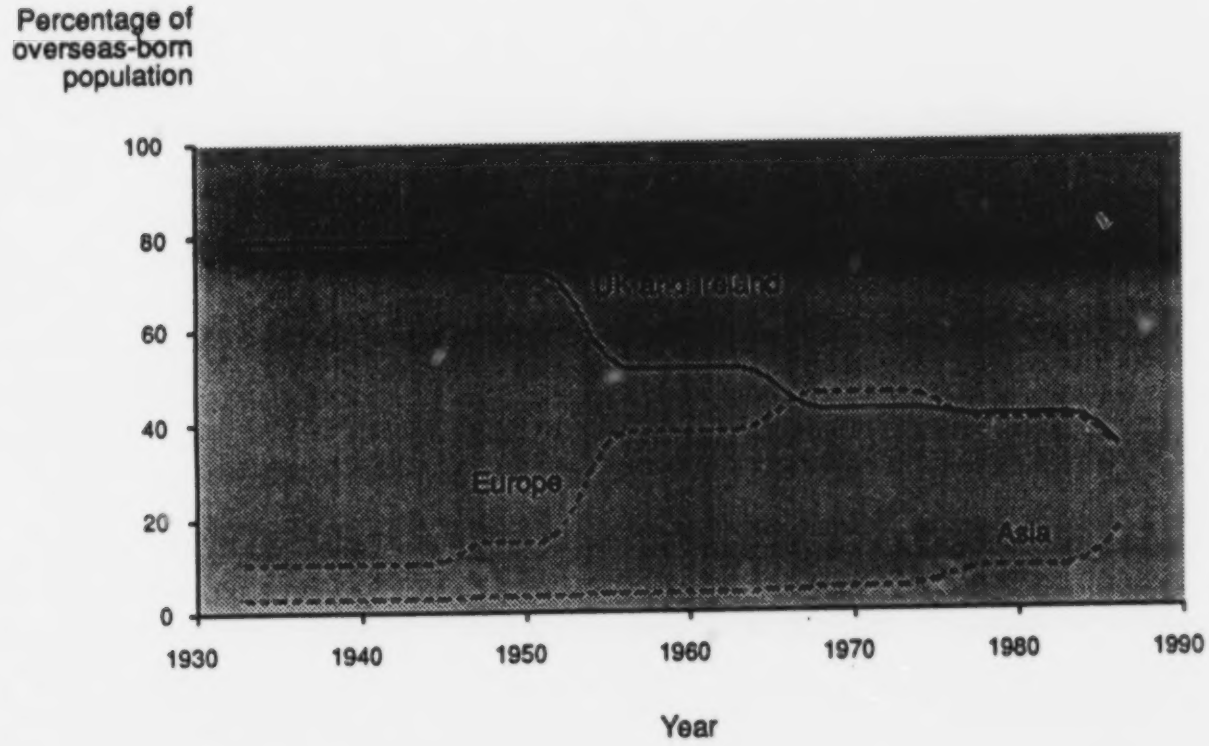
## PROPORTIONS OF OVERSEAS-BORN POPULATION IN AUSTRALIA




Source: *Australian Bureau of Statistics, Census of Population and Housing*





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## OUR POPULATION

This group of students decided to look at where Australians have come from. Their display included a graph which is on the opposite page.

**What have been the major changes in migration to Australia as shown on the graph?**

**Can you explain why people from overseas have migrated to Australia?**

**What effects has that migration had on the Australian way of life?**



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# APPENDIX B

## Response categories

**Item 1** What do these symbols tell us about Australia and Australians?

**Purpose:** To determine students' ability to symbolise from a set of instances.

**Responses**

**Level 3** Response treats the stimuli as representing an aspect of our past or rurality or the Australian myth. Usually gives an instance in support.

*(e.g. That Australia has a strong farming culture and most Australians like to think themselves as country people at heart.)*

**Level 2** Response gives a simple generalisation which is directly related to the stimuli.
*(e.g. We are farmers and live in the country.)*

**Level 1** Response gives a literal one-by-one interpretation of the stimuli.
*(e.g. The hat tells us ... the cave paintings tell ... we have farms where dogs ... )*

or

Response draws an unsupported inference from the stimuli.
*(e.g. Australia is a hot and dry country.)*

**Level 0** Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 3 | Year 5 = 15.2% | Year 9 = 29.4% |
| Level 2 | Year 5 = 25.9% | Year 9 = 24.0% |
| Level 1 | Year 5 = 33.8% | Year 9 = 24.0% |
| | Year 5 = 17.7% | Year 9 = 18.8% |
| Level 0 | Year 5 = 7.4% | Year 9 = 3.8% |

**Item 2** Explain how well the display does or doesn't represent life in Australia today.

**Purpose:** To determine students' ability to recognise the diverse nature of Australian lifestyles.

**Responses**

**Level 3** Response treats the stimuli as representing some aspect of Australia but notes the lack of 'city' things.
*(e.g. None of the pictures show any scenes from the Australian cities.)*

**Level 2** Response claims that now is somehow 'different'.
*(e.g. In the main [this] represents the ... not many people are droving ... but it shows our ancestory (sic)... )*

**Level 1** Response gives a literal one-by-one assessment of the stimuli.
*(e.g. The ram does but the cave paintings don't ... )*

or

Response indicates that the stimuli represents Australia well
*(e.g. It shows things that were and still are in Australia and it does represent the life in Australia.)*

**Level 0** Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 3 | Year 5 = 11.8% | Year 9 = 39.1% |
| Level 2 | Year 5 = 29.7% | Year 9 = 26.1% |
| Level 1 | Year 5 = 13.4% | Year 9 = 16.1 |
| | Year 5 = 26.9% | Year 9 = 11.7% |
| Level 0 | Year 5 = 18.2% | Year 9 = 7.0% |

**Item 3** What do the customs and traditions in the display tell you about Australia and Australians?

**Purpose:** To determine students' ability to symbolise from a set of instances.

**Responses**

**Level 4** Response indicates that Australian customs are a blend of others.
*(e.g. ... Australian way of life is made up of many customs from other countries that we use.)*

**Level 3** Response indicates that there are 'Australian' and other traditions here.
*(e.g. ... not only Australian customs ... celebrations of other people as well ... in harmony.*

**Level 2** Response gives a simple generalisation which is directly related to the stimuli.
*(e.g. We have lots of people from other countries ...)*

or Response suggests traditions endure.
*(e.g. We keep traditions ...)*

**Level 1** Response gives a literal one-by-one interpretation of the stimuli. *(e.g. We celebrate Christmas by giving presents ...)*

**Level 0** Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 4 | Year 5 = 6.4% | Year 9 = 26.4% |
| Level 3 | Year 5 = 2.4% | Year 9 = 4.2% |
| Level 2 | Year 5 = 10.8% | Year 9 = 9.2% |
| | Year 5 = 17.8% | Year 9 = 28.9% |
| Level 1 | Year 5 = 38.1% | Year 9 = 20.5% |
| Level 0 | Year 5 = 24.4% | Year 9 = 10.7% |

**Item 4** Explain how well the display does or doesn't represent our Australian way of life.

**Purpose:** To determine students' ability to recognise the multicultural nature of Australian society.

**Responses**

**Level 2** Accepts that there is a range of ways of celebrating in Australia.
*(e.g. It does show how we do something special. ... we are made up of many backgrounds.)*

**Level 1** Response claims that some stimuli are not Australian.
*(e.g. It doesn't ... because they come from other countries.)*

or

Response indicates that the stimuli are wrong in some way.
*(e.g. We don't bless a boat we break champagne on it ... and we cry at a funeral not celebrate.)*

**Level 0** Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 2 | Year 5 = 24.4% | Year 9 = 46.2% |
| Level 1 | Year 5 =7.1% | Year 9 = 7.1% |
| | Year 5 = 22.9% | Year 9 = 22.4% |
| Level 0 | Year 5 = 45.6% | Year 9 = 24.3% |

**Item 5** What do you think our flag tells us about our past?

**Purpose:** To determine students' ability to 'read' symbols.

**Responses**

**Level 4** Response indicates that we once were British and are a commonwealth of states (not the British or other commonwealths).
*(e.g. It tells me that we originated from England, we have seven states ... )*

**Level 3** Response emphasises that we are or were part of a commonwealth. (Not the Australian Commonwealth) and, or, are British.
*(e.g. We're a commonwealth country.)*

**Level 2** Response suggests that we are or were of British heritage.
*(e.g. The flag tells us of our British heritage. ... the Union Jack and the Queen.)*

**Level 1** Response indicates that Australia was discovered or settled by the British.
*(e.g. It tells us that Britain is the country who discovered Australia ... )*

or Response links the flag to wars.
*(e.g. We fought for the flag.)*

**Level 0** Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 4 | Year 5 = 6.2% | Year 9 = 8.2% |
| Level 3 | Year 5 = 2.4% | Year 9 = 14.7% |
| Level 2 | Year 5 = 22.2% | Year 9 = 38.0% |
| Level 1 | Year 5 = 6.4% | Year 9 = 5.4% |
| | Year 5 = 5.5% | Year 9 = 4.4% |
| Level 0 | Year 5 = 57.3% | Year 9 = 29.3% |

**Item 6** What does the 1992 opinion poll tell us about Australians' views on changing the flag?

**Purpose:** To determine students' ability to give reasonable interpretations of tabular data.

**Responses**

**Level 4** Response synthesises many elements of the data.
*(e.g. The people who are older do not want the flag changed. The number of people decreases as the age decreases.)*

**Level 3** Response uses a comparison between more than two groups or polls.
*(e.g. Most people want to keep the flag as it is. Mostly woman and from 40 – 55+ but there's about 37% who want the flag to be changed.)*

**Level 2** Response uses a comparison between two groups or polls.
*(e.g. It has changed 9% from 1982. It shows that older men and women would rather not change.)*

**Level 1** Response focuses on the total column.
*(e.g. That most people like the flag and would like to keep it that way.)*

**Level 0** Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 4 | Year 5 = 2.0% | Year 9 = 6.5% |
| Level 3 | Year 5 = 0.9% | Year 9 = 5.2% |
| Level 2 | Year 5 = 7.5% | Year 9 = 18.5% |
| Level 1 | Year 5 = 37.7% | Year 9 = 42.4% |
| Level 0 | Year 5 = 52.0% | Year 9 = 27.3% |

**Items 7 & 8** What do the polls suggest is likely to happen in the future? Why do you think this might happen?

**Purpose:** To determine students' ability to draw supportable inferences from tabular data.

**Responses**

**Level 3** Response states that there will be a change brought about by the young or lack of elderly.
*(e.g. I think in the future the younger generation will opt for a change.)*

or Response states that change will be caused by weakening ties with Britain or increased Australian nationalism.
*(e.g. I think this might happen because ties with Britain are decreasing.)*

or Response suggests there are many foreigners in Australia or that Australia is multicultural.
*(e.g. ...there are a lot of foreign people who don't care. It might happen through the increasing multicultural population.)*

**Level 2** Response states that there will be a change brought about by a shift in the 'change' figures.
*(e.g. ... that more people are wanting the flag changed.)*

**Level 1** Response simply states a conclusion without supporting evidence or reference to data.
*(e.g. In the future there is likely to be a change of flag.)*

or Response suggests that there will be no change, usually because of the poll totals.
*(e.g. Because that's what people want.)*

**Level 0** Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 3 | Year 5 = 1.8% | Year 9 = 14.5% |
| | Year 5 = 4.2% | Year 9 = 22.6% |
| | Year 5 = 1.1% | Year 9 = 1.5% |
| Level 2 | Year 5 = 8.2% | Year 9 = 10.9% |
| Level 1 | Year 5 = 36.3% | Year 9 = 28.1% |
| | Year 5 = 14.3% | Year 9 = 8.6% |
| Level 0 | Year 5 = 34.2% | Year 9 = 13.8% |

**Item 9** What have been the major changes in migration to Australia as shown on the graph?

**Purpose:** To determine whether students can draw inferences from graphical data.

**Responses**

**Level 4** Response relates changes to some element of time. All groups are described and the times are explicit.
*(e.g. ... decreasing Anglo-Saxon population from 1950 onwards, ... increasing Asian population from 1985 onwards.)*

**Level 3** Response includes a statement about each of the three groups identified on the graph.
*(e.g. The English and the Irish have decreased rapidly while Europeans have rapidly increased. The Asians have only recently started to increase.)*

**Level 2** Response states that some groups have increased and some decreased. Not all groups are described.
*(e.g. ... people in the UK and Ireland have lost interest in living in Australia but the Asian population is increasing.)*

**Level 1** Response fails to describe change and focuses on reporting a 'fact' from the graph.
*(e.g. That most of the people come from UK and Ireland.)*

**Level 0** Response confuses 'over-seas born' with births in the respective countries.
*(e.g. The UK and Ireland started with a lot of people being born there but then it went down. Europe and Asia had barely any people born but then they went higher.)*

**or**

Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 4 | Year 5 = 3.5% | Year 9 = 10.2% |
| Level 3 | Year 5 = 6.4% | Year 9 = 27.1% |
| Level 2 | Year 5 = 11.9% | Year 9 = 20.0% |
| Level 1 | Year 5 = 13.6% | Year 9 = 10.0% |
| Level 0 | Year 5 = 0.7% | Year 9 = 1.3% |
| | Year 5 = 63.9% | Year 9 = 31.5% |

**Item 10** Can you explain why people from overseas have migrated to Australia?

**Purpose:** To determine what students believe prompts migration.

**Responses**

**Level 4** Response lists reasons which could be described as indicating in Australia one would have a better life (eg jobs).
*(e.g. To obtain a better lifestyle for themselves and their families, by having more work opportunities and better living standards.)*

**Level 3** Response lists both 'better' and 'escape' reasons for migration
*(e.g. People here have different reasons: war, famine, jobs, better life.)*

**Level 2** Response suggests a better environment.
*(e.g. ... because it is tidier and the air is much cleaner.)*

or Response indicates that people migrate to avoid war or poverty or lack of work..
*(e.g. ...their country could be in war.)*

or Response states that there is political and/or racial-cultural freedom here.
*(e.g. Because it is a free country and offers a non-racial community.)*

**Level 1** Response suggests people migrate to see other countries.
*(e.g. My mum and dad came to Australia to have a look around.)*

**Level 0** Irrelevant, uninterpretable or missing responses.

| | | |
|---|---|---|
| Level 4 | Year 5 = 12.1% | Year 9 = 22.8% |
| Level 3 | Year 5 = 9.7% | Year 9 = 28.2% |
| Level 2 | Year 5 =10.6 % | Year 9 = 12.2% |
| | Year 5 = 19.8% | Year 9 = 12.2% |
| | Year 5 = 0.2% | Year 9 = 5.4% |
| Level 1 | Year 5 = 2.5% | Year 9 = 0.8% |
| Level 0 | Year 5 = 45.1% | Year 9 = 18.4% |

**Item 11** What effects has that migration had on the Australian way of life?

**Purpose:** To determine whether students can relate migration to its effects on society.

**Responses**

**Level 3** Response states that there has been either changes or additions to the Australian culture.
*(e.g. The country is a mix of nationalities.)*

**Level 2** Response states that migrants have taken Australian's jobs or land.
*(e.g. ... it has overcrowded Australia ... people from overseas have been taking over our factories and companies.)*

**Level 1** Response clearly indicates that migration is a bad thing for Australia.
*(e.g. We are made to accept people from foreign countries and their customs.)*

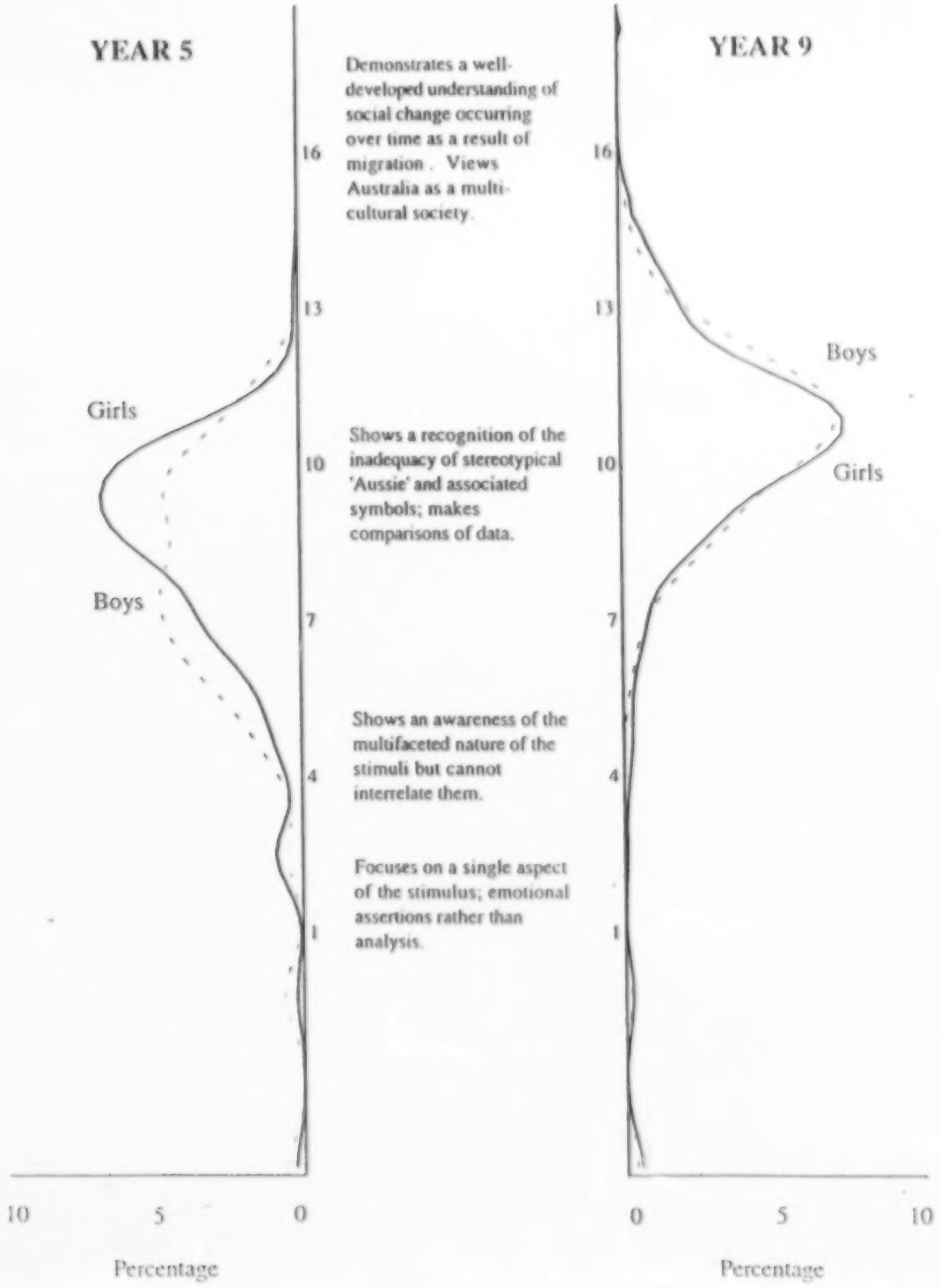
or Response shows awareness of racism towards some migrants by other Australians.
*(e.g. They call us wogs.)*

**Level 0** Irrelevant, uninterpretable or missing responses.

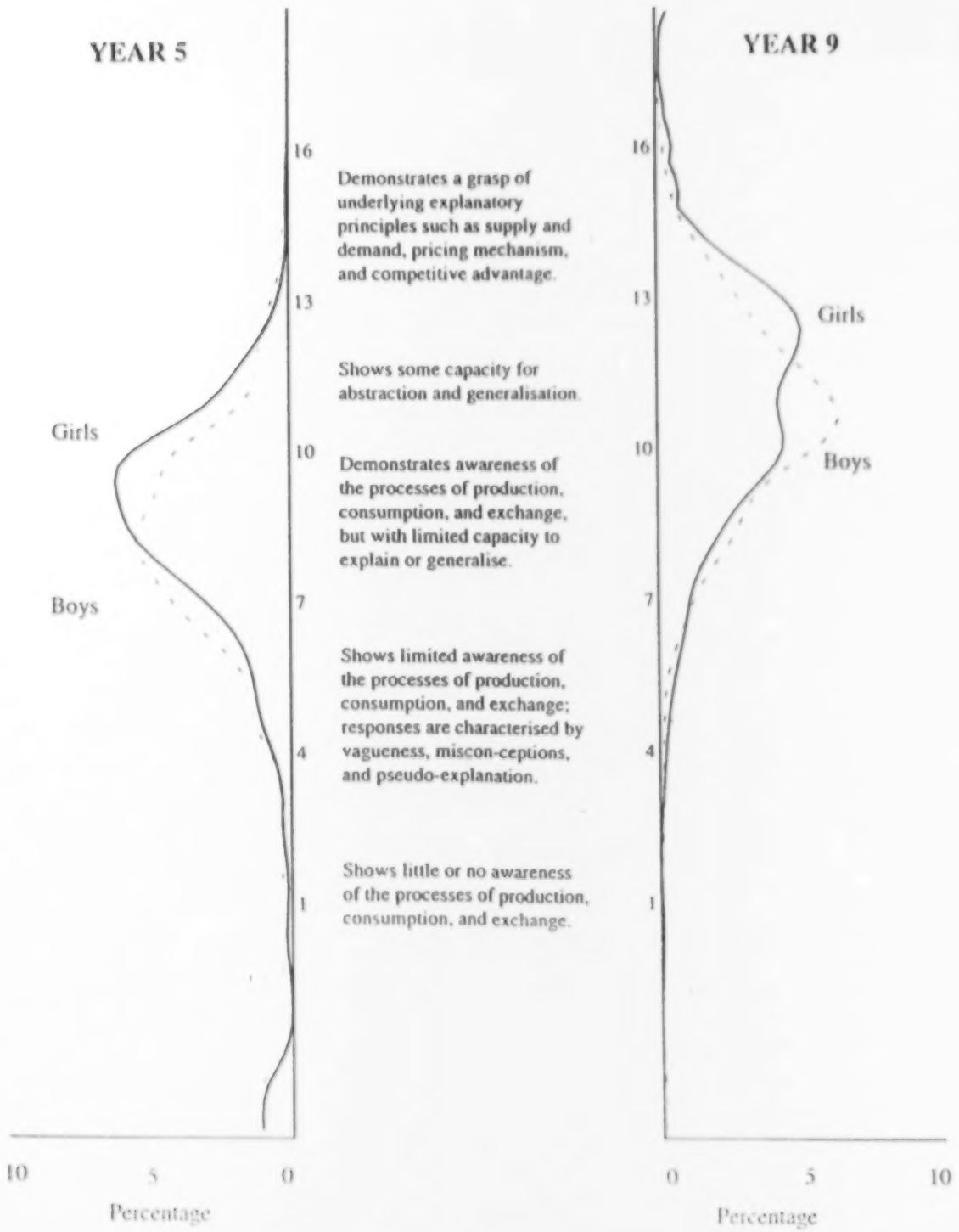
| | | |
|---|---|---|
| Level 3 | Year 5 = 19.0% | Year 9 = 43.2% |
| Level 2 | Year 5 = 6.6% | Year 9 = 16.3% |
| Level 1 | Year 5 = 10.3% | Year 9 = 13.8% |
| | Year 5 = 1.5% | Year 9 = 6.3% |
| Level 0 | Year 5 = 1.5% | Year 9 = 20.3% |

# APPENDIX C

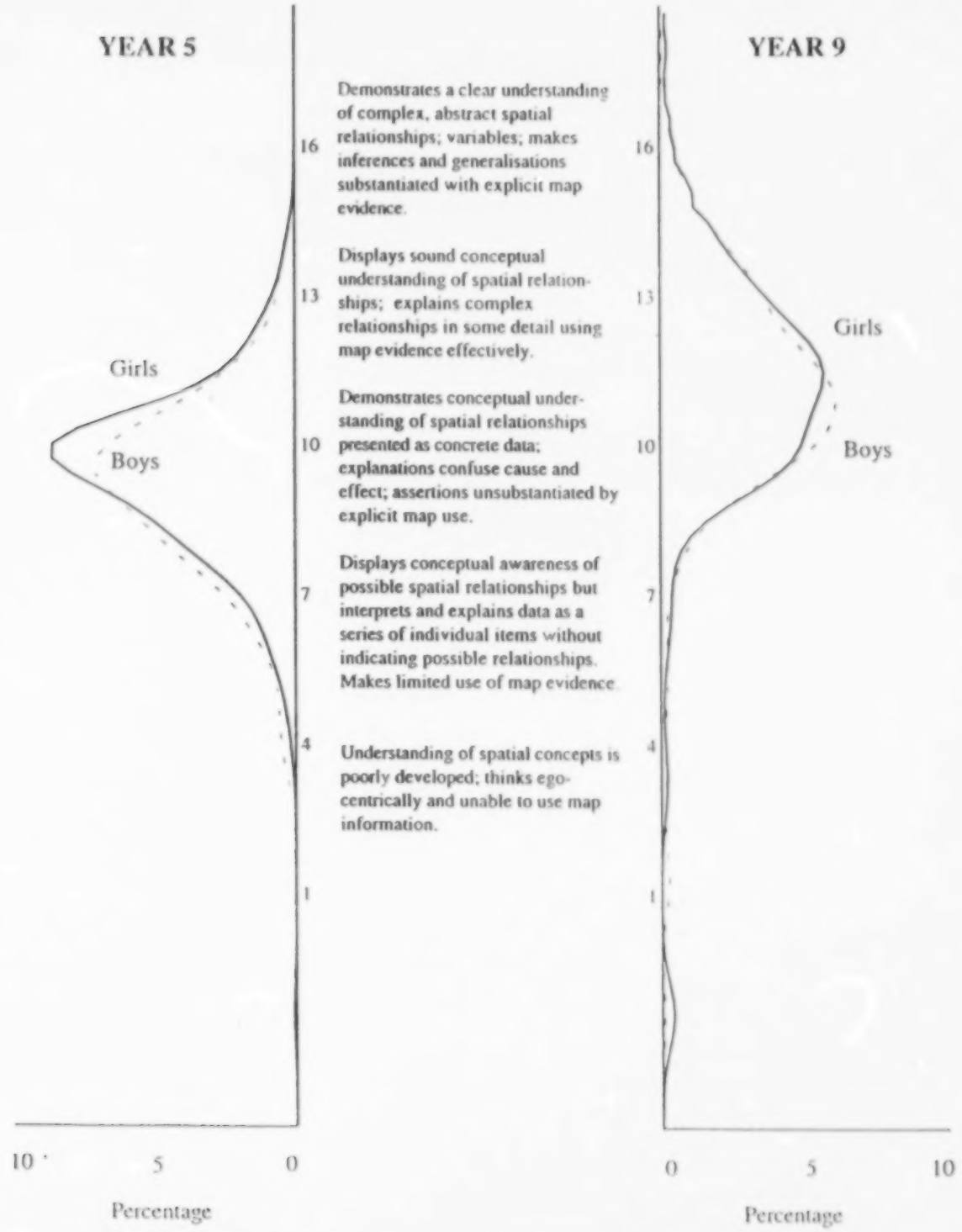
## Variable Maps



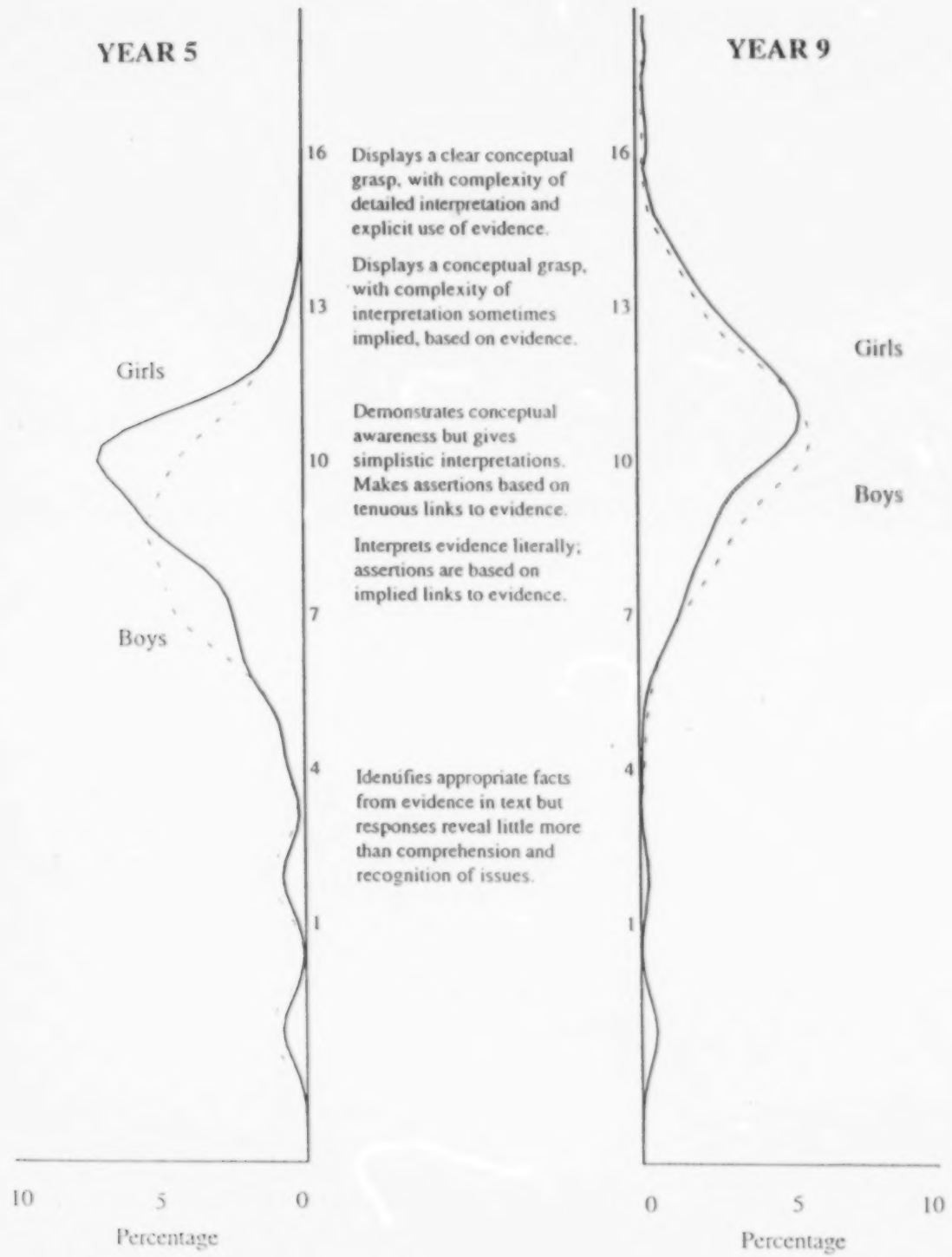

**Continuum of Increasing Cultural Understanding**


YEAR 5
YEAR 9
16
13
10
7
4
1
Girls
Boys
Demonstrates a grasp of underlying explanatory principles such as supply and demand, pricing mechanism, and competitive advantage.
Shows some capacity for abstraction and generalisation.
Demonstrates awareness of the processes of production, consumption, and exchange, but with limited capacity to explain or generalise.
Shows limited awareness of the processes of production, consumption, and exchange; responses are characterised by vagueness, miscon-ceptions, and pseudo-explanation.
Shows little or no awareness of the processes of production, consumption, and exchange.
10
5
0
Percentage

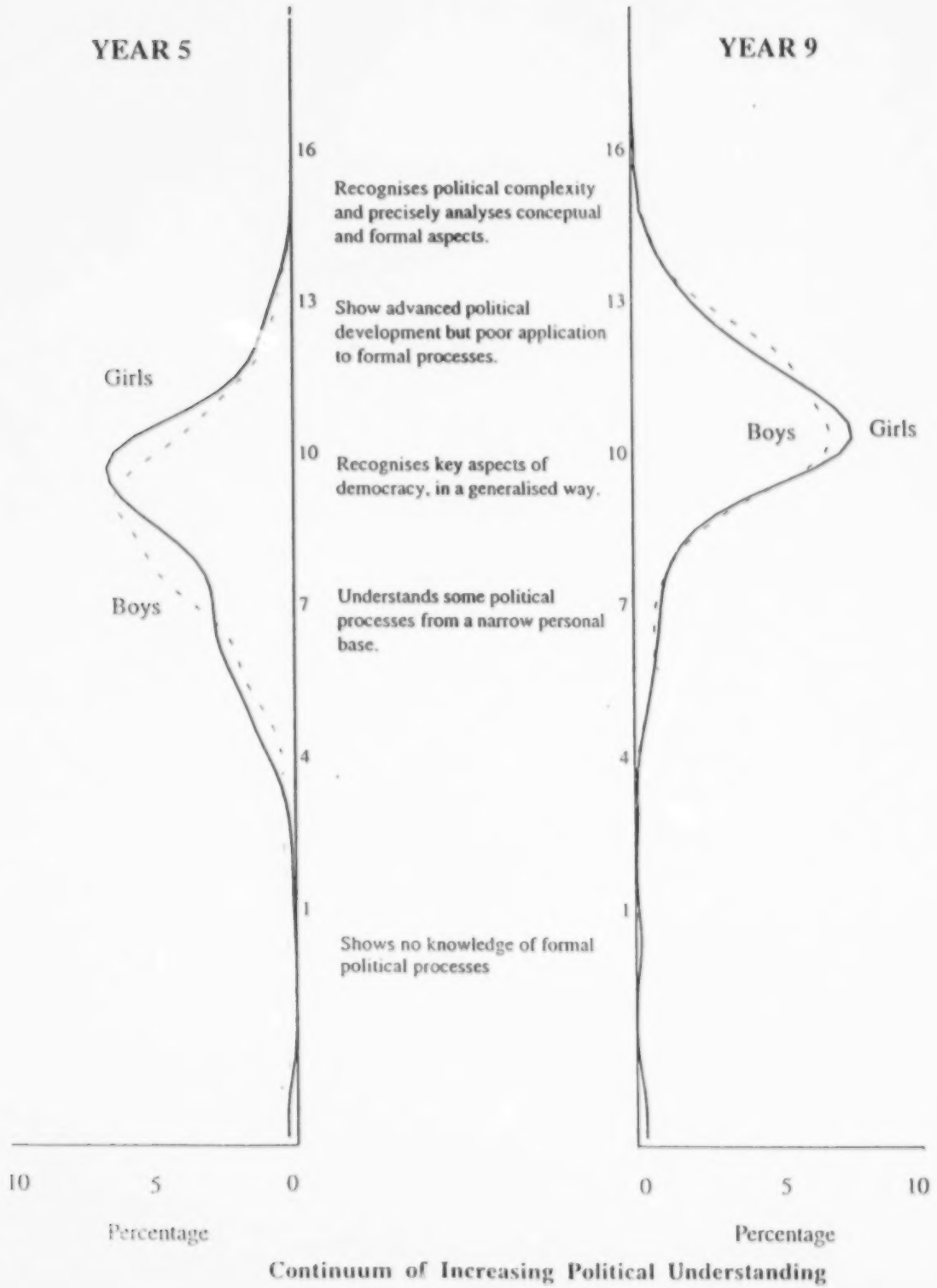
**Continuum of Increasing Economic Understanding**


YEAR 5
YEAR 9
Girls
Boys
Girls
Boys
16
13
10
7
4
1
Demonstrates a clear understanding of complex, abstract spatial relationships; variables; makes inferences and generalisations substantiated with explicit map evidence.
Displays sound conceptual understanding of spatial relationships; explains complex relationships in some detail using map evidence effectively.
Demonstrates conceptual understanding of spatial relationships presented as concrete data; explanations confuse cause and effect; assertions unsubstantiated by explicit map use.
Displays conceptual awareness of possible spatial relationships but interprets and explains data as a series of individual items without indicating possible relationships. Makes limited use of map evidence.
Understanding of spatial concepts is poorly developed; thinks egocentrically and unable to use map information.
10 5 0
0 5 10
Percentage
Percentage

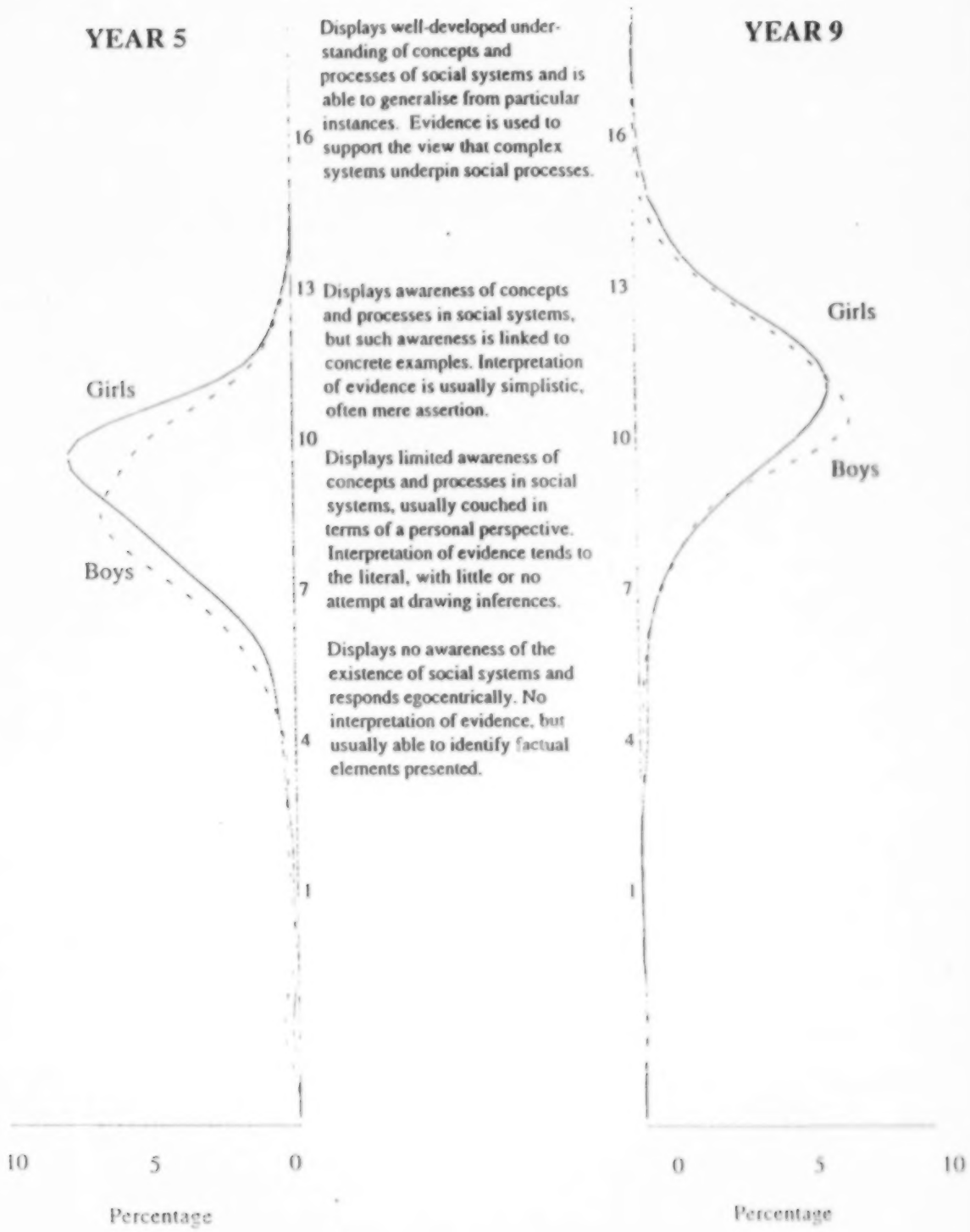
**Continuum of Increasing Geographical Understanding**




**Continuum of Increasing Historical Understanding**




**Continuum of Increasing Political Understanding**


YEAR 5
YEAR 9
Displays well-developed understanding of concepts and processes of social systems and is able to generalise from particular instances. Evidence is used to support the view that complex systems underpin social processes.
16
Displays awareness of concepts and processes in social systems, but such awareness is linked to concrete examples. Interpretation of evidence is usually simplistic, often mere assertion.
13
Displays limited awareness of concepts and processes in social systems, usually couched in terms of a personal perspective. Interpretation of evidence tends to the literal, with little or no attempt at drawing inferences.
10
Displays no awareness of the existence of social systems and responds egocentrically. No interpretation of evidence, but usually able to identify factual elements presented.
7
4
1
Girls
Boys
Girls
Boys
10
5
0
0
5
10
Percentage
Percentage

A General Continuum of Conceptual Development in Social Education